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# **Fermilab Integrated Safety Management Plan**

August 2002  
Revision No. 5

# FERMILAB INTEGRATED SAFETY MANAGEMENT PLAN

Revision No. 5

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[http://www-esh.fnal.gov:8001/Mgmt\\_Plan/](http://www-esh.fnal.gov:8001/Mgmt_Plan/)

# FERMILAB INTEGRATED SAFETY MANAGEMENT PLAN

## Revision No. 5

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### 1.0 INTRODUCTION

Fermilab submitted the first Integrated Safety Management Plan (ISMP) to the DOE Fermi Area Office on April 1, 1997 fulfilling a requirement in the Fermilab contract, which went into effect January 1, 1997. This revision, Revision No. 5, incorporates changes made since August 2001 in Fermilab ES&H Programs as part of the ongoing continuous improvement. The ISMP provides a roadmap linking existing policies and programs to the Integrated Safety Management (ISM) format, addressing the seven guiding principles and the five core functions of ISM. The ISMP encompasses the scope and expectations of both the Integrated Safety Management Policy and the ES&H Management Plan. Sections 2 through 5 address the requirements of the DOE Integrated Safety Management Policy. Section 6, Annual Implementation Plan, outlines the Annual Plan and references 3 appendices. It is intended that these appendices get updated each year along with this plan.

Section 2 of the ISMP presents the key policies, practices, and organizational features that support integrating safety into all aspects of Fermilab work. Section 4.0 of the ISMP discusses how each of the ES&H functions is integrated into the work of Fermilab and how each of the ES&H principles is addressed within each function. However, four of the principles, *Line Responsibility*, *Clear Roles and Responsibilities*, *Competence Commensurate with Responsibilities*, and *Balanced Priorities* are so fundamental to any management system that they are discussed separately in Section 3.0. Two principles, *Identification of Standards and Requirements* and *Hazard Controls Tailored to the Work*, are more specific to the function *Develop and Implement Controls* and are thus mostly addressed under that function discussion. *Operations Authorization* is most specific to the function *Do Work Within Controls* and therefore primarily discussed in that section.

The safety program for subcontractors, users, and visitors is integrated into the Fermilab ES&H program, but is discussed separately, for emphasis and clarity in Section 5.0.

Appendix A discusses the ES&H performance expectations that are in the Fermilab/DOE contract.

Appendix B is a summary of ES&H performance measures that is updated annually. It also contains the ES&H Budget Plan and Risk Management Summary, also updated annually.

## **2.0 LABORATORY ORGANIZATION AND POLICIES FOR ISM**

### **2.1 Integrated ES&H Management Policies**

Fermilab's mission is to advance the understanding of the fundamental nature of matter and energy by providing leadership and resources for qualified researchers to conduct basic research at the frontiers of high energy physics and related disciplines.

It is the objective of Fermilab Management to systematically integrate excellence in ES&H into the management and work practices of all activities at all levels so that our mission is achieved while protecting the public, the worker, and the environment. This is accomplished by ensuring that the overall management of safety functions and activities is an integral part of our mission accomplishment.

In February 1998 the Director issued the following policy statement.

"Fermilab employees and users will only conduct work and operations in a safe and environmentally sound manner."

The policy is reaffirmed every year by the Environment, Safety and Health Executive Committee. Furthermore, the Director announced multi-year goals for reducing the injury rate of the Laboratory employees, users, and subcontractors. Success in meeting these goals and the contractual performance measures is monitored by the Director and division/section heads through periodic reports from the Senior Laboratory Safety Officer at the weekly Scheduling Meetings. New goals are established every year. For CY2002 the goal included the recognition that the overall goal is zero injuries.

### **2.2 Organizational Approach to Performing Work Safely**

An overview of the organizational structure of the Lab is given here to show how the Laboratory organizational approach supports the functions and principles of integrated safety management. Roles and responsibilities are discussed in more detail in Section 3.

The foundation of integrated safety management is line responsibility; i.e., the line organization must have the authority, responsibility, and be held accountable for integrating ES&H into, and as a part of, all of the work that they do. Line responsibility for safety is woven into the organizational structure, as well as all aspects of the ES&H program at Fermilab. The Laboratory Director has ultimate responsibility for all aspects of ES&H for all work done under the URA/DOE contract on the Fermilab site. The Director delegates the ES&H responsibility to the line managers (division/section heads) assigned to carry out the work. The responsibility is further delegated to line supervisors and ultimately to the workers.

At the same time, the Director has established a staff organization of ES&H professionals (ES&H Section) independent of the line organizations, one function of which is to provide the Director with an independent assessment of the effectiveness of the line managers in carrying out

their responsibilities. This is similar to a corporate safety function within commercial organizations. In turn, most line managers (division/section heads) have professional ES&H personnel on their staff to support their implementation of the Lab's ES&H program and to provide the managers with assessments of the effectiveness of their personnel in implementing the Lab's ES&H program. The number of ES&H professionals and the nature of their expertise vary depending upon the type of work conducted by the line organization. Thus, there is an ES&H organizational structure independent of, but parallel to, the line organization that advises the line organization on ES&H matters, but does not usurp the responsibility for ES&H performance from the line organization.

The Environment, Safety and Health Executive Committee (ESHEC) is a high level committee of senior Laboratory officials whose function is to advise the Director on ES&H/QA policy. Annually, the ESHEC reviews progress in meeting current year labwide ES&H goals and establishes the next-year labwide ES&H goals. Membership of the ESHEC includes the Director, who serves as chair, Deputy Director, Associate Directors, and the division/section heads. The Associate Director for Operations Support is vice chair. The ES&H Section Associate Heads are ex-officio members.

A Laboratory Safety Committee (LSC) has been established to provide an avenue for Laboratory employees to advise the Director on ES&H policy and program needs. There is extensive worker participation on the LSC, the LSC subcommittees, and their sub-panels. About 140 employees participate on these committees. About one quarter are safety professionals with varying expertise, the others are physicists, engineers, technicians and other support personnel. The technical expertise harnessed by the subcommittees is crucial to the development of effective technical safety programs (for example cryogenic, electrical, and mechanical safety) and to the technical review of the implementation of those programs. The Associate Director for Operations Support is the chair of the LSC.

### 2.3 Integrating ES&H into Business Practices

This section highlights some of the ways safety is integrated throughout the business practices of Fermilab—e.g., purchasing, contract management, property management and shipping and receiving. Section 5 also provides some details of ISM and subcontracting practices.

#### Purchasing

The Laboratory Purchasing Department integrates ES&H throughout the life cycle of their activities. They participate in determining specifications on purchase orders; e.g., ensuring affirmative procurement is followed in obtaining recycled material when appropriate. The Purchasing Department checks for appropriate signature approval as specified in the Fermilab ES&H Manual (FESHM). It is also their responsibility to ensure acquisition of material safety data sheets as needed.

#### Shipping and Receiving

The Shipping and Receiving Department ensures that material meets ES&H requirements when it arrives and that it is distributed within the Lab according to the requirements of the Fermilab ES&H Manual. They keep records of the distribution of hazardous material on site. They also ensure applicable requirements are met for all off-site shipments.

### Stockroom

The Stockroom clears all new chemicals to be stocked through ES&H professionals. The Stockroom also works with the ES&H Section to identify and obtain less hazardous chemicals for replacement stock.

### Property Group

The Property Group operates the Laboratory's program for recycling scrap metal. They carefully monitor that recycled material meets all ES&H requirements. There is also an active program to excess property when possible. This group ensures that all material received for storage meets the ES&H requirements established for stored material.

## 2.4 Integration Factors

It is our intent that the management systems at Fermilab satisfy the Objective of Integrated Safety Management as stated in DOE P 450.4. Fermilab policies and programs are designed to systematically integrate ES&H into the management and work practices at all levels so that our mission is accomplished while protecting the public, the worker, and the environment.

The Laboratory program is documented in several manuals--ES&H Manual, Radiological Control Manual, Emergency Response Plan, etc. The requirements of the program are to be implemented uniformly across Laboratory organizations unless there is a reason for different implementation practices. In recent years Lab management has made an increasing effort to minimize organizational differences; e.g., more standardization in training, a uniform traffic violation policy. Of course, some requirements are only applicable in some organizations; e.g., Safety Assessment Documents, and radiation safety interlock requirements.

Fermilab strives to allow divisions/sections to implement the Laboratory (institutional) ES&H Program within their organizations in a way that makes the most sense for their organizations. In practice, there is a lot of division/section participation in the development of institutional programs and considerable effort is made to obtain universal buy-in as Lab programs are developed, so implementation variations are few. Uniformity is imposed where implementation by one organization may have a negative impact on another; e.g., training uniformity is nearly universal, traffic enforcement is universal. Therefore, in nearly all cases, there are distinct variations in implementation at the division/section level or activity level only when there is a need because of the nature of the operations. Table 1 (see below) indicates a few cases where implementation of the core functions is distinguishable at the division/sections or activity level. Section 4 also elaborates on variations in implementation at different levels.

The Laboratory practice of ensuring that draft ES&H programs receive labwide review ensures that hazard control systems within a specific functional area do not conflict with controls established in other functional areas. This distribution and review allows experts from various disciplines and technical skills to provide input on the proposals before they are adopted.

**Table 1**

**Implementation of Core Functions at Different Organizational Levels**

Most of the documentation of implementation of the ISM Core Functions is at the institutional (Laboratory) level. This appendix lists, for each core function, some examples of implementation mechanisms identifiable at the institutional level, division/section level or project/activity level.

<b>Core Functions</b>	<b>Institutional Level</b>	<b>Divisional Level</b>	<b>Project or Activity Level</b>
1. Work Planning	<ul style="list-style-type: none"> <li>Fermilab Institutional Plan</li> <li>ES&amp;H Management Plan</li> <li>Environmental Monitoring Plan</li> <li>Radiological ALARA Plan</li> <li>Emergency Plan</li> <li>QA Plan</li> <li>Spokespersons Proposals for Experiments</li> </ul>	<ul style="list-style-type: none"> <li>Project Engineering Manual (FESS)</li> <li>Pre-Route Planning for Commercial Carrier Transports (BSS)</li> <li>Beams Division Procedures (BDSP -08-0601)</li> <li>ALARA Reviews</li> <li>Work Notification Form</li> </ul>	<ul style="list-style-type: none"> <li>Conceptual Design Report Development</li> </ul>
2. Hazard & Risk Analysis	Hazard Assessment Document – Site Emergency Plan	<ul style="list-style-type: none"> <li>Safety Assessment Document (SAD)</li> <li>Preliminary Hazard Analysis (PHA)</li> <li>NEPA Reviews</li> <li>ES&amp;H review of procurements</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Experimental ES&amp;H Review Committee (PPD)</li> <li>PPE Hazard Assessment</li> <li>Job Hazard Analysis</li> <li>ODH Analysis</li> <li>Work Notification Form</li> <li>Electrical Hazard Analysis/Work Permit</li> </ul>
3. Establishment of Control	<ul style="list-style-type: none"> <li>Work Smart Standards</li> <li>FESHM</li> <li>Fermilab Radiological Control Manual</li> <li>Engineering Standards</li> </ul>	<ul style="list-style-type: none"> <li>Division Procedures</li> <li>Beam Permit (BD)</li> <li>Run Conditions (PPD)</li> <li>Skill of Craft (FESS)</li> <li>Operation Readiness Clearance (TD)</li> <li>Keylogger/training requirements (BD)</li> </ul>	<ul style="list-style-type: none"> <li>Department/Group Procedures</li> <li>Interlock Procedures (BD)</li> <li>Search &amp; Secure (BD)</li> <li>Conduct of Operations</li> </ul>
4. Work Performance	<ul style="list-style-type: none"> <li>Actual work is performed at the Project or Activity Level</li> <li>Development and Maintenance of ES&amp;H Guidance Documents</li> </ul>	<ul style="list-style-type: none"> <li>Training</li> </ul>	<ul style="list-style-type: none"> <li>Management Information System Control (FESS)</li> </ul>
5. Feedback & Improvement	<ul style="list-style-type: none"> <li>External: <ul style="list-style-type: none"> <li>Federal and State Regulatory Agencies</li> <li>DOE</li> <li>URA</li> </ul> </li> <li>Internal: <ul style="list-style-type: none"> <li>Triennial Self-Assessment Program &amp; Lessons Learned</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Self-Assessment Program</li> <li>Safety Committees</li> <li>Customer Surveys</li> <li>Environmental monitoring (snoops, sumps, etc.)</li> <li>ALARA assessments</li> <li>Interlock tests</li> </ul>	<ul style="list-style-type: none"> <li>Self-inspections/reviews</li> <li>Subcontractor performance evaluations</li> </ul>



		• shielding reviews	
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## Vertical Integration

Vertical integration of the ES&H program is facilitated by the downward flow of information regarding expectations for ES&H program implementation, from the top down through the organizational lines. At the same time, vertical integration provides mechanisms for the upward flow of information about problems in implementing the ES&H program including the need for support and resources from the worker and through the organization to supervisors, and/or upper management, as appropriate. Numerous mechanisms are built into the way Fermilab and DOE conduct business to provide vertical integration of the ES&H Program.

The downward flow of information takes on many forms from very formal correspondence, audits, and contracts to more informal exchanges such as e-mail, conversations, and walkthroughs. Conversely, many mechanisms have been developed for information to flow upward, from the front line workers, to Laboratory management, and through the DOE elements as appropriate. Additional examples of these two-way mechanisms are described in Table 2 (see below).

**Table 2**

**Facilitating Vertical Integration of Integrated Safety Management**

Vertical Integration of the ES&H program provides assurance that:

- expectations and policy flow down through the organization and
- information and requests for resources/support flows up the organization.

This table lists, for each level of the organization, some of the mechanisms used by that organization to facilitate the vertical integration of ES&H.

DOE-SC	Site Visits	Office of Science (SC) personnel (both ES&H and program people) visit for program reviews and informational visits. These visits provide an avenue for direction from SC and for Fermilab to feed information back to the program office.
	Correspondence	Fermilab receives official correspondence from SC giving both program and non-program (administrative) direction. In return the lab sends correspondence to SC providing information requested as well as informing them of problems and successes.
	Special Meetings	Fermilab attends special meetings organized by SC at which two-way communication occurs.
	Project Reviews	SC conducts periodic reviews of Fermilab projects. These reviews include reviews of technical, cost, schedule and ES&H aspects of the projects.
	Project Validations	Before projects are begun there is a review of the management structure, cost, schedule, and ES&H to validate plans.
	Annual Program Review	Each year there is an SC review of the status of the Fermilab Physics program. This is conducted by a combination of SC staff and peers.
	Institutional Review	Each year there is an institutional review by the Head of Office of Science.
	KD4 Validation	At the KD4 point, SC validates that the project is complete--including that all ES&H aspects are completed; i.e., SAD, ARR, envelope.
Fermi Area Office (FAO)	Weekly, Tuesday 4 PM Meeting	Every week a meeting is held between the Fermi Area Manager and the Fermilab Directorate to discuss mutual problems, progress on requested reports and progress on projects
	Monthly, N&S Change Review Meeting	Each month a meeting is held with the ES&H staff of the FAO, the ES&H Section Head, and an Associate Head to discuss mutual problems, progress on ES&H initiatives, and policy/program changes for continuous improvement.
	Contract Negotiations	Periodically, contract changes are negotiated between Fermilab and the Contracting Officer. Each year contract performance measures are negotiated.
	Letters (formal communication)	The Contracting Officer sends formal correspondence to Fermilab providing direction for program and support areas.
	Program reviews	The FAO participates in all program reviews (HEP, construction, budget, institutional, ES&H, etc.) conducted by CH, SC, or HQ. In addition, the FAO is the point of contact for all inspections/assessments by external agencies--e.g., EPA, IEPA, etc. Fermilab receives direction from the FAO as appropriate during such reviews--both informally during the review and formally in transmission of the reports.

	Attend Fermi Meetings	Various members of the FAO staff are invited to attend select Fermilab meetings. This interchange provides an opportunity for direction and two way information flow.
	Operational Awareness	The FAO staff frequently visits various parts of the site at their choosing. Their observations (formal and informal) provide information to Fermilab. The Facility Representative program is a part of this.
	Weekly Construction Inspections	Staff from the FAO, ES&H staff from Fermilab and the members of the Fermilab directorate visit current construction sites each week. The FAO documents their findings.
	Weekly, Monday 4 PM, All Experimenters Meeting	Members of the FAO staff attend the weekly All Experimenters Meeting. Thus, they hear about program progress, problems and the anticipated schedule for operations.
	Tripartite Assessments	Members of the FAO staff participate in planning the tripartite assessments. They also participate in many of the assessments and lead some of them. This provides formal opportunities for ES&H direction and an opportunity to obtain feedback from Lab management and workers.
URA	Letters	Formal communication occurs between URA and Fermilab on all aspects of the operation of Fermilab.
	Board of Overseers	Every 6 months the URA Board of Overseers visits Fermilab to review the management, physics program, business areas, and the ES&H Program. The Board is made up of university and industry representatives. Formal reports are issued after each meeting in each area.
	Informal Communication	There are frequent phone and e-mail communications between the Lab and URA.
	URA Visiting Committees	The committee is charged with reviewing the scientific program and commenting on its quality, soundness, overall balance, and future prospects. Committee members include about a dozen university physicists and industrial research firms. A second committee will annually review the administrative and support functions.
High Energy Physics Community	HEPAP	The High Energy Physics Advisory Panel advises the Director on the physics program.
	Users Organization	The Fermilab Users Organization members are physicists using Fermilab for research. The organization provides formal and informal communication between the users and Fermilab.
	Users Executive Committee	The Executive Committee of the Users Organization meets regularly with Fermilab management and provides feedback on the adequacy of the program and facilities.
	Special planning meetings.	Special meetings of members of the high energy physics community, (e.g., Snowmass and Aspen) provide special long and short range advice to Fermilab.

Directorate (including the Senior Lab Safety Officer as staff)	Budget Meetings	There is a series of annual meetings of the Directorate with division/section heads for each division/section head to present his/her program and budget plans for the coming fiscal year.
	Correspondence	Written communication from the Director to division/section heads and or employees gives program and administrative direction to the line organizations.
	Weekly, Tuesday 9:30, Scheduling Meetings	At these weekly meetings of the Directorate, division/section heads, and other senior managers there is a discussion of program and administrative matters.
	Special Lab-Wide Meetings	Special meetings are held when appropriate to communicate information directly from the Director to employees.
	Coordination Meetings	Members of the Directorate meet regularly with division/section heads to coordinate activities and give direction.
	Internal Reviews	The Director organizes internal reviews of projects and programs as needed.
	ES&H Section Head formal communication	The ES&H Section Head, as Senior Laboratory Safety Officer, issues periodic formal informational and directional communication to division/section heads.
	ESHEC	The ES&H Executive Committee, chaired by the Director, meets with division/section heads and other senior managers to discuss ES&H policy matters.
	LSC	The Laboratory Safety Committee, chaired by the Associate Director for Operations Support, meets each month with division/section representatives and chairs of technical safety subcommittees to advise the Director on ES&H matters.
	ES&H Policy	All ES&H policy is approved by the Director and posted on the Lab's web site. Notice of changes are sent to division/section heads, safety persons and other managers.
	FermiNews	The bi-weekly Fermilab publication carries ES&H items of general interest.
	PMGs	The Director sponsors periodic Program Management Group meetings for major construction projects.
	Workshops	The Director sponsors physics workshops on subjects of particular interest to the Fermilab program.
	Program Planning Office	The Fermilab Program Planning Office acts as liaison between the Lab and the user community.
	Users Office	The Fermilab Users Office provides information and administrative services to the user community.
	Program Advisory Committee	This committee of physicists advises the Director on the physics program.
	Monday, 4 PM, All Experimenters Meeting	This weekly meeting of Fermilab and user personnel provides a "short term forum" for discussion of the status and plans for the program during the current research period.

D/S Heads	Division/Section heads have a variety of mechanisms to integrate ES&H into their activities	Senior Safety Officers Internal Safety Committees Internal reviews Staff meetings Walk-throughs Formal correspondence Annual Performance Reviews
Line Managers and Supervisors	Line managers and supervisors also have a variety of mechanisms to integrate ES&H into their activities	Staff meetings Formal communication Annual Performance Reviews Walk-throughs Committees Work reviews Work planning sessions
Employees	Employees have a variety of mechanisms to participate in the integration of ES&H into their work	Annual Performance Reviews Walk-throughs Participation on internal committees Participation on Lab committees Open door policy of Director Accident/injury investigations
	Work Smart Standards Annual Review	Each year employees are asked to participate in the review of the adequacy of the Work Smart Standards



## Horizontal Integration

Horizontal integration is needed to provide for normalcy (i.e., within an organization, similar controls would be expected for similar hazards and similar work) and compatibility (i.e., avoid conflicting requirements among organizations and technical disciplines).

Many of the vertical integration mechanisms discussed above also provide opportunities for horizontal integration. For example, coordination meetings and committee meetings not only provide for passing information up and down the chain of responsibility, but often provide opportunities for program comparisons at the horizontal level. Table 3 contains examples of horizontal integration mechanisms.



**Table 3**

**Facilitating Horizontal Integration of Integrated Safety Management**

Horizontal Integration of the ES&H program provides assurance that:

- Peer organizations exchange ideas--e.g., lessons learned & success stories,
- ES&H processes are similar in similar organizations.

This table lists, for each level of the organization, some of the mechanisms used by that organization to facilitate the horizontal integration of ES&H.

SC	Site visits	During SC site visits there is often exchange of information about ES&H programs at other labs.
Fermi Area Office (FAO)	Tripartite Assessments	During their participation in the Tripartite Assessments ES&H personnel from the FAO provide information to division/section personnel about their observations in other lab organizations and external organizations.
	Operational Awareness	During the site visits and participation in lab meetings, the FAO personnel share information about ES&H programs elsewhere. This includes the Facility Representative program.
	Readiness Reviews	FAO personnel participating in Readiness Reviews provide insight into how other organizations have addressed ES&H problems.
	Weekly construction reviews	FAO personnel conducting their weekly construction reviews share observations about ES&H practices at other construction sites.
URA	BoO ES&H Subcommittee	Members of the BoO ES&H Subcommittee share their knowledge of ES&H programs at other labs, universities, and in industry.
Users	Formal and informal communication	Physicists, engineers, and technicians using the Fermilab research facilities frequently give us the benefit of their experience with the ES&H programs at other labs (in this country as well as other countries), universities and industries with which they are familiar.
Directorate	Members of the Directorate (and some line personnel) provide information about other ES&H programs as a result of participation in external reviews and organizations. Examples include:	Readiness reviews at other labs, Program reviews at other labs, Professional Society Meetings, and DOE conferences.
	Lab Safety Committee	Part of each LSC meeting consists of the sharing of lessons learned and success stories among divisions/sections.
	ES&H Executive Committee	Frequently, ES&H Executive Committee meetings incorporate lessons learned and other horizontal information exchanges.

ES&H Section	Operational Awareness	Members of the ES&H Section have a variety of operational awareness activities that provide opportunities for information exchange: e.g., walkthrough visits, surveys, meeting attendance, passing “lessons learned”.
	Tripartite Assessments	During planning meetings and assessments the ES&H Section stimulates transfer of information.
	Liaison	Members of the ES&H Section work with divisions/section in support of the line safety programs.
	SSO Meeting	The SSO meetings sponsored by the ES&H Section consist largely of information exchange.
Divisions/ Sections	SSO operational awareness	Line Senior Safety Officers share many of the ES&H Section items listed above.
	LSC	Every division/section has one line representative on the Lab Safety Committee. Many other division/section personnel are members of one or more subcommittee or panel.
	Committees	Divisions/Sections have established committees that address (at least in part) ES&H issues within that organization. This provides opportunities to share information among the sub organizations.
	Walk-throughs	Divisions/Sections have regular walk-through inspections of their operating areas. These constitute one mechanism to share information among sub organizations.
Employee	Participation on Lab Committees	Many employees have opportunities to learn how their peers at the Lab integrate ES&H through their participation on the many committees, subcommittees, and panels.
	Accident/incident investigations	Each accident/incident provides opportunities for employees, supervisors, and ES&H personnel to share information.
	FermiNews	FermiNews carries articles to all employees about the ES&H related activities at the Lab.

## 2.5 Worker Participation

It is understood at Fermilab that safety cannot be imposed from above. The work will be safe only if workers are involved in the process of developing safe work procedures. Mechanisms in place to provide for worker involvement include: ES&H committees within the divisions/sections, worker participation in line self assessments, participation on teams that develop draft ES&H policies and programs, participation in the review and comment on draft ES&H policies and programs, and participation in the development of and teaching of ES&H training courses. Worker participation was critical to the success of all the initiatives highlighted below in Section 2.6.

## 2.6 ES&H Initiatives

In 1995 Fermilab incorporated Work Smart Standards into its contract with DOE. This simpler and more stable set of requirements has given the Lab the opportunity to use its resources for improvements in the ES&H program. In particular, there has been more emphasis on OSHA compliance, greater effort to tailor internal controls to the work we do, and a reallocation of resources to better balance priority needs in the ES&H program.

Other ES&H initiatives include:

- DuPont™ ES&H training of management,
- DuPont™ ES&H training of Operations Managers,
- DuPont™ ES&H training of supervisors,
- Safety Stand-down in 1998 to emphasize job hazard analysis and ISM,
- Revised definition of responsibilities of Construction Coordinators and Task Managers,
- New training courses for Construction Coordinators and Task Managers, and quarterly updates,
- Revised ES&H requirements in subcontracts,
- Development of Subcontractor Safety Orientation,
- Construction safety experts moved to the ES&H Section,
- Directorate reviews (ESHEC) of ES&H program initiatives in the line organizations,
- ES&H illness/injury reports reviewed at weekly scheduling meetings,
- Established ES&H goals for the Lab,
- Development of a Lab Policy Manual, and
- Development of the Tripartite Self-Assessment Program.

## 3.0 **OVERRIDING MANAGEMENT PRINCIPLES**

Although all the ISM management principles are crucial for a successful integrated safety management plan, the principles of *Line Responsibility*, *Clear Roles and Responsibilities*, *Competence Commensurate with Responsibility*, and *Balanced Priorities* are fundamental to any successful management plan and are thus called overriding principles and discussed separately in this section of the Plan. The other principles, *Identification of Standards and*

*Requirements, Hazard Controls Tailored to the Work*, and *Operations Authorization* are somewhat specific to certain safety management functions and are thus included in the discussions of the ISM Functions as appropriate.

### 3.1 Line Responsibility

Line responsibility has been the cornerstone for the development of the ES&H program at Fermilab. Within the Laboratory, responsibility for safety at all levels is explicitly defined in the Fermilab ES&H Manual (FESHM) Chapter 1030 as follows.

"The Laboratory Director is ultimately responsible for safety, but each person at Fermilab is responsible for establishing knowledgeable control of the hazards encountered at the Laboratory. The necessary level of knowledgeable control is established by a combination of formal training and common sense.

It is Fermilab policy that each employee is accountable to a supervisor who is a member of the line management. Each member of line management is accountable to the next higher level of management in their respective division/section. Ultimately, the head of each division/section is accountable to the Director."

This FESHM chapter goes on to define the detailed ES&H responsibilities of the line organization from individuals through supervisors to division and section heads and on up to and including the Laboratory Director. This chapter includes specification of the method for reassigning ES&H responsibilities. To avoid unclear or ambiguous direction the chapter further states:

"In situations where the responsibilities of individuals or organizations are unclear or ambiguous, the Director or his designee will assign the responsibilities."

### 3.2 Clear Roles and Responsibilities

As indicated above, FESHM Chapter 1030 identifies the ES&H responsibilities of members of the line organization at Fermilab. Chapter 1030 also identifies roles and responsibilities of various safety personnel, other staff with special ES&H responsibilities, and all others performing work at or otherwise using the Fermilab facilities.

The ES&H Manual defines responsibilities for all Laboratory employees, experimenters, certain employees trained to perform hazardous tasks, individuals who sponsor special events, supervisors, building managers, spokespersons for experiments, division/section heads, division/section Senior Safety Officers, the Senior Laboratory Safety Officer, the ES&H Section, and the Directorate.

When there are special responsibilities, i.e., specific responsibilities above and beyond the general responsibilities described in Chapter 1030, those responsibilities are called out at the beginning of each section of the FESHM.

### Key responsibilities

The Laboratory Director sets ES&H policy, and provides direction on implementation strategies and budgets. Line supervisors are responsible for planning and conducting work safely, consistent with established policy and direction, and assuring that worker training and qualifications are appropriate. Building managers have landlord responsibility for providing a safe infrastructure to perform work. Line workers are responsible for the safe performance of work, including planning and budgeting (e.g., the ES&H Plan and planning for experiments), hazard identification (e.g., Hazard Assessment Documents), work controls (e.g., writing procedures and supporting safety committees), and assessments (e.g., Tripartite Self-Assessment Program).

A central ES&H Section is established to provide, in part, Laboratory-wide ES&H expertise, corporate consistency, support to line divisions/sections, provision of ES&H training and records, environmental monitoring, and ES&H oversight. In addition, the ES&H Section has certain specified line responsibilities for procurement, maintenance, storage, monitoring, and development of certain ES&H programs and materials.

Fermilab emphasizes line safety responsibility by establishing safety organizations within many of the divisions and sections. The number and credentials of personnel in those organizations are appropriate for the ES&H needs of the division/section. Laboratory organizations with relatively little ES&H exposure, as an alternative to having their own ES&H personnel, may develop memoranda of agreement with the head of the ES&H Section to supply safety expertise as needed. Each division/section has a Senior Safety Officer (SSO). The responsibilities of the SSOs is spelled out in FESHM 1030 and includes the authority and responsibility in situations of imminent ES&H peril, to report to the division/section head, the Senior Laboratory Safety Officer, or the Director. Communication of the Senior Safety Officers with the Senior Laboratory Safety Officer and Director is facilitated by monthly meetings which all attend.

Division/Section safety groups, including Senior Safety Officers, provide a close link to planning, managing, and performing work safely. Members of these safety organizations, as members of that division/section, participate in the work planning, self-assessments, project design, and budgeting activities. The role of these line safety organizations is key in integrating ES&H with the work.

The Director appoints a Senior Laboratory Safety Officer who is charged with advising the Director in all ES&H matters and who has full stop work authority. The Senior Laboratory Safety Officer is also the Laboratory Environmental Protection Officer, Laboratory Senior Radiation Safety Officer, and the Head of the ES&H Section.

Stop work authority for employees and users is specified in the FESHM Chapter 1030. Every individual working at the Laboratory has the authority (and responsibility) to stop any work, which they feel is not safe. Every level of supervision is responsible to stop work for which they are responsible that is not safe. Full stop work authority rests with all Senior Safety Officers. FESHM Chapter 7010 describes the stop work authorities and procedures for subcontract work.

The Environment, Safety and Health Executive Committee membership includes all division/section heads, key ES&H Section personnel, and other senior Laboratory officials, whose function is to advise the Director on ES&H policy. The Laboratory Safety Committee has the responsibility for reviewing safety policies and programs, and for reporting findings and recommendations to the Laboratory Director. Section 1030TA of the ES&H Manual provides a description of the responsibilities of these and other relevant ES&H committees and subcommittees.

### 3.3 Competence Commensurate with Responsibilities

Key management and safety positions are filled by appointment by the Director based on his/her knowledge of the skills needed for the position and the competency of candidates. This includes the division/section heads, Senior Laboratory Safety Officer, safety committee chairs, safety committee members and project managers.

The hiring process is viewed as a crucial element in having a competent staff. Personnel requisition forms are designed to encourage the requisitioner to define critical skills and physical requirements. The recruiting staff is trained to seek the best qualified candidates. The interview process is designed to explore and document candidate qualifications compared to position requirements. When employment offers are made, the Personnel Office takes measures to ensure that the candidates meet the minimum qualifications.

Newly hired persons receive orientation training. Supervisors are encouraged to ensure the new employees receive on-the-job-training. Promotions and transfers are monitored by the Personnel Office to ensure appropriate requirements are met. Required safety training is specified in the FESHM. Supervisors are responsible to ensure employees have a training plan and are fulfilling the requirements. The ES&H Section and/or the DOE Fermi Area Office periodically audit ES&H training materials, courses and training records as part of the Tripartite assessment program.

An Annual Performance Review is conducted for each employee each year. The review form has questions about employee responsibilities, skills, training, performance and future training needs. Both the employee and supervisor comment on each item. Employees and supervisors meet and discuss each item. Supervisors are required to sign the form as validation of the review. Employees are requested to sign the forms as indicating they have participated in the review and are encouraged to note on the form any disagreement with the supervisor evaluation. Division/Section heads review all forms from personnel within their organization. All

performance review forms are reviewed by the Fermilab Personnel Office to ensure that there is a follow-up resolution to any problems that are noted.

### 3.4 Balanced Priorities

The key to balancing priorities is ensuring those who make the decisions are authorized to do so and that they have accurate information about the hazards, risks and controls.

Priorities of the physics program, administration, safety etc. are discussed each week at the Fermilab Scheduling Meeting. This meeting, attended by the Director, all division/section heads, program planning and other members of the Directorate has a standing agenda that includes physics operations, off-normal/unusual occurrences, a report on occupational injuries/illnesses and other significant accidents during the preceding week, as well as special items of interest, and reports from every division/section. This is a long-standing planning and prioritization meeting.

The prioritization process relies heavily on the ESH&I Management Plan. Each year ES&H activities and resource needs are identified and rolled-up through the ESH&I Management Planning Process, that is a risk-based prioritization and decision-making program used by the Laboratory to support balanced priorities and resource allocation decisions. Using Activity Data Sheets to document ES&H needs, activities, and risk evaluations, line and ES&H professionals provide planning and budgeting information for informal comment by the Senior Laboratory Safety Officer, the Directorate, and the DOE Fermi Area Office. Comments are incorporated into the plan and it is submitted to the Directorate for any final management adjustments. The Senior Laboratory Safety Officer is responsible for informing the Director if he/she believes the priorities are not appropriate. The final plan is formally transmitted to the Fermi Area Office for concurrence. Each year the SC Program Office provides comments on and concurs with the plan.

Division/Section heads are responsible for funding all ES&H needs within their organizations. It is the Director's policy that all ES&H needs that cost less than 1 % of the organization's budget must be done, without question, with the provided budget. More expensive needs must be brought to the attention of the Director if funding is not planned within the year. Urgent items are dealt with immediately, funded by the Directorate, if necessary. Items that are not funded in the current year are identified in the ESH&I Management Plan.

The results of the ESH&I Management Plan are integrated into the Laboratory internal budget reviews, that include organization, staffing, budget plans, and program plans for the coming year for each division/section. Progress on projects in the ES&H Management Plan are tracked during the year by the Senior Laboratory Safety Officer. All projects using GPP funding are also tracked by the Associate Director for Operations Support.

The Associate Director for Operations Support meets every week with the Senior Laboratory Safety Officer and his/her staff to discuss ES&H priorities. Furthermore, the Associate Director

for Operations Support meets frequently with the Director to discuss priorities--including ES&H priorities.

## **4.0 INTEGRATED SAFETY MANAGEMENT FUNCTIONS**

### **4.1 Defining the Scope of Work**

Fermilab's mission is to advance the understanding of the fundamental nature of matter and energy by providing leadership and resources for qualified researchers to conduct basic research at the frontiers of high energy physics and related disciplines.

The contract for the operation of Fermilab establishes the overall statement of work for the Laboratory, and contains explicit expectations and performance measures related to the safe performance of work (see Appendix A of this Plan). The Statement of Work (Article 4), and the Environment, Safety and Health clause (Article 72), clearly reflect the safety principles and safety management concept of integrating safety into the way work is managed and performed at the Laboratory.

The annual budget/work authorization process defines the work to be done each year. This cycle begins with the submission by the Lab of Field Work Proposals (also called Work Authorization Packages) that define the work anticipated by the Lab for current year work and work for the two following years. Subsequent to that submission there is an on-site DOE Program Review, which reviews the plans for the current and future years, with recommendations for modification of the work plans defined in the Field Work Proposals. Finally, at the beginning of the fiscal year a Financial Plan is sent to the Lab defining the work for the year and the fund allocation for each work package. During the fiscal year, each month, there is a refinement of the financial plan--adding or subtracting work/money.

Work is also defined within the construction authorization system--generally for GPP, AIP projects, and Congressional line item construction projects. The Lab prepares Conceptual Design Reports and appropriate NEPA documentation and submits requests for Project Directives to the Contracting Officer. Approval of the project includes approval of the cost, scope and schedule. Significant changes to the project require approval by the Contracting Officer.

Weekly meetings are held between the DOE Contracting Officer and the Directorate to discuss contractual issues, reporting requirements, project progress, and other administrative matters such as ES&H performance. Monthly meetings are also held between ES&H personnel in the DOE Fermi Area Office, the Directorate and the Senior Laboratory Safety Officer to discuss ES&H issues of mutual interest to DOE and the Lab.

Laboratory performance measures (including ES&H performance measures) are established annually in negotiation with the DOE to support the conduct and evaluation of the work (see Appendix A of this Plan). Performance measures are communicated to the line management,



ES&H professionals, and other employees. ES&H performance measures are frequently discussed at the weekly Scheduling Meeting.

The Fermilab Policy Manual contains policies that control how mission and program direction from DOE is integrated into work (i.e., the policy on new Orders). Upon receipt of a DOE Directive, Order, or other outside initiative/direction, the Associate Director for Administration (designated as the central point of contact for formal external documents) reviews the document for applicability at Fermilab. This review includes consideration of the current DOE contract requirements and commitments, current policies and practices, and consultation with individuals from appropriate line organizations. In some cases an ad hoc directive review group is formed.

Within the Lab, there are a number of mechanisms for the Director to define the work at the division/section level. For example, divisions/sections participate in the annual budget process described above. Thus, Field Work Proposals prepared by the division/section heads define their anticipated work. With the arrival of the each financial plan, the Director authorizes divisions/sections to conduct the work described in the plan. Section 4.4 (Operations Authorizations) and Tables 2 and 3 list other mechanisms that also serve as ways for work to be defined within the Lab.

The Director provides direction to division/section heads for their development of specific plans related to the program, organizational and project management plans, as well as budgets. ES&H review and advice is provided by the ES&H Section, the Laboratory Safety Committee, and the ES&H Executive Committee.

Line organizations are responsible for planning the work and identifying ES&H activities and resources needed to support the work. Once annual operating plans are developed, ongoing work planning and project management is the responsibility of the division/section heads, who provide recommendations to the Directorate. The Directorate also holds weekly meetings with line and safety managers to discuss planned work and to establish priorities. Progress on priority items is also tracked and reported at the weekly Scheduling Meeting.

The physics community has formal input to the Director via the Physics Advisory Committee and the Users Organization (Users Executive Committee). In addition there are many formal and informal communications to the Director by individual physicists and universities. Various physics conferences and project reviews also provide guidance to the Director.

Laboratory programs to meet long term or strategic goals generally consist of a set of projects. These projects are organized according to the tenets of the Life Cycle Asset Management Order DOE 430.1 and Program and Project Management for the Acquisition of Capital Assets Order DOE 413.3. Project management includes requirements for defining the scope, and the establishment of estimated costs and schedules.

## 4.2 Identifying and Analyzing Hazards

Before work is performed at the Laboratory, hazards are identified and analyzed so that appropriate controls can be developed. Hazard analyses are performed at both the facility level and at the project level for major projects as well as at the activity level by all Fermilab employees and subcontractors. See also Section 5 for hazard analysis for construction projects.

The identification and analysis of hazards is performed at several levels by teams comprised of both ES&H Section safety professionals and line organization technical and safety professionals. Section 2.4 provides further discussion of hazard analysis at various organizational levels.

The complexity and formality of the hazard identification process and subsequent development of work controls are tailored to the specific conditions and work activity. Similarly, individual hazard analyses are tailored to the specific conditions and nature of the work. In addition, the ES&H Manual identifies the requirements and training necessary to assure that personnel conducting these reviews are qualified.

### Laboratory Level Hazard Identification Processes

A site-wide Hazard Assessment Document was first prepared in 1993. It is reviewed annually and revised accordingly to document the reduction in inventory of chemicals such as Chlorine gas and PCBs.

Fermilab was the first DOE facility to implement the Necessary and Sufficient (Work Smart Standards) process. An extensive survey of managers, safety personnel, line supervisors and workers was conducted. The resulting catalogue of hazards was the basis for selecting a set of standards that is necessary and sufficient. Since the adoption there has been an annual survey of managers, safety personnel and the DOE Fermi Area Office to assess whether the list of hazards is still accurate. The list is updated as appropriate.

Hazard identification is a routine part of the self-assessment program. The self-assessment program includes requirements for supervisor, manager, and building manager walk-throughs, Fire Department inspections, and the Tripartite Self-Assessment Program.

Laboratory-wide analysis of hazards is performed annually as part of the process of preparing the ES&H Management Plan which is coordinated by the ES&H Section, with involvement of all line organizations. This partnering of safety and technical expertise assures that facility and activity-specific knowledge is provided for hazard identification and verification, that Laboratory-wide perspectives are considered during the analysis, and that consistency is maintained throughout the process. The result of this Laboratory-wide effort is a set of identified hazards that are reviewed by the Senior Laboratory Safety Officer and Directorate.

### Facility/Project Level Hazard Identification Processes

Hazard identification and analysis are required of subcontractors in their contracts with the Laboratory.

In many cases local hazards are also identified via facility-specific Hazard Maps prepared by ES&H Section and line personnel. Hazard Maps provide key building hazards information in a standardized and manageable format, that includes input from the ES&H Section and line operating organizations. Standard symbols are used to convey hazards at a glance.

Formal safety assessment documents are prepared to identify and analyze potential hazards for all research activities. (Current Safety Assessment Documents used to identify and analyze hazards include Accelerator; Experimental Areas; CDF; D0; and the Main Injector.)

In addition, procedures have been established to assure that Fermilab personnel and visiting experimenters have a consistent approach for identifying and controlling hazards related to experiments. These procedures are administered by the Beams Division and Particle Physics Division.

Subcommittees of the Laboratory Safety Committee are frequently employed to review issues that require specialized knowledge or broad organizational representation such as the safety of cryogenic systems or development of safety policies. Division/Section review committees are employed in a similar fashion, but at lower levels.

#### Work Level Hazard Identification Processes

On an individual level, periodic Health Risk Assessments of employees includes review and identification of potential worker hazards.

Employees are encouraged to report ES&H issues and many problems are routinely identified by this mechanism. Several hundred employees have attended a 10 or 30 hour OSHA compliance course. Although these courses are not intended specifically for hazard recognition examples are used in the courses to explain the OSHA standards.

In parallel with these specific hazard analyses efforts, the ES&H Section or safety officers from the line organizations perform industrial hygiene and radiation surveys. Other surveys to identify hazards include: radioactive material snoop surveys of normally occupied areas and vehicles to locate any potential radioactive items which may have strayed from normal controls, and Mobile Environmental Radiation Laboratory (MERL) surveys to measure prompt radiation resulting from accelerator operations (mostly muons and neutrons). Fermilab performs surveys of ventilation to monitor flow performance of local exhaust systems used to control hazardous air contaminants and machine guarding surveys to evaluate machine guarding/shielding status as needed.

FESHM 2060 describes the Fermilab program for implementing job hazard analysis. Some division level internal procedures have been developed to implement this FESHM chapter—e.g., PPD's OPER\_004.

#### 4.3 Developing and Implementing ES&H Controls

Fermilab has adopted the Necessary and Sufficient Process to determine appropriate ES&H controls to ensure the safe operations of the accelerator and the safe conduct of experiments. Fermilab, in conjunction with participation from the DOE Fermi Area Office, the Chicago Operations Office and the Office of Science, conducted the first site-wide application of the Departmental Necessary and Sufficient Closure Process. By mid-1995, Fermilab had determined its applicable set of Work Smart Standards to address identified hazards and incorporated them into the URA operating contract. Since the Work Smart Standards were a subset of the standards that existed prior to their adoption, implementation primarily involved a tailoring of the Lab procedures.

While the Lab's Work Smart Standards address the entire scope of hazards, documentation establishing the Accelerator Safety Envelope is the Accelerator Safety Assessment Document, developed in accordance with the Work Smart Standards. Safety Assessment Documents are periodically updated by line organizations when the configuration of the affected facility or activity changes as the result of improvement projects. These documents are also updated if new hazards are introduced or the risk from a hazard increases beyond that previously analyzed and documented necessitating new controls. These documents are subsequently reviewed and approved by the Senior Laboratory Safety Officer and, as appropriate, the Fermilab Director and the DOE Fermi Area Office.

Fermilab has traditionally supplemented its own technical and management expertise in developing ES&H controls with peer review. For example, peer review teams have been established in the disciplines of cryogenic safety, radiation protection, and ES&H management. In particular, peer participation was a central part of the selection of the Work Smart Standards.

The documents that establish ES&H controls for the majority of the Laboratory's work and operations are the FESHM, Fermilab Radiation Control Manual (FRCM) and the Emergency Response Plan. Controls are also documented in the Procedures for Experimenters (PFX).

By combining the foundation created by its approved Work Smart Standards with the more specific implementation guidance contained in the FRCM, PFX, FESHM, and other management documents, Fermilab ensures that ES&H controls remain adequate and tailored to the work being performed.

The ES&H roles and responsibilities of all Fermilab employees are defined in the FESHM. As stated in Section 1030, it is the responsibility of the line managers/supervisors to identify requirements and to establish adequate ES&H controls to ensure that all work undertaken at Fermilab is performed in a safe and compliant manner.

Prior to the start of any significant project<sup>1</sup>, a project management plan and resource-loaded schedule are developed, into which is integrated the applicable ES&H controls. This management plan and schedule are reviewed by the DOE, technical peers and ES&H professionals for adequacy prior to the commencement of the project and periodically during the project. If the project involves changes in the configuration of the accelerator or experimental areas, formal readiness reviews are conducted by the Lab in conjunction with the DOE Fermi Area Office.

For complex experiments or operations involving significant hazards; e.g., electrical, oxygen deficiency, activation of a new or modified beamline, etc., a formalized checklist is utilized to ensure adequate ES&H controls are in place. These completed checklists undergo a detailed review prior to the commencement of any work, operation or experiment. Often technical committees are established to ensure the technical basis for the controls is sound.

#### 4.4 Performing Work Safely

Fermilab's Integrated Safety Management program is focused on providing the tools and incentives for work to be done safely.

The policy statement from the Director reflects a joint commitment by the Laboratory senior managers and the Director, and captures the spirit of the Integrated Safety Management Plan at Fermilab.

"Fermilab employees and users will only conduct work and operations in a safe and environmentally sound manner."

In most cases at Fermilab, the people who do the work also participate in the planning for the work--i.e., analyzing the hazards, determining the controls and implementing the controls. This avoids disconnects between those planning and implementing controls and those doing the work. It also makes good use of worker knowledge in the planning process.

The mechanisms established to ensure all workers are prepared and able to perform work safely include pre-job hazards analysis and planning, the establishment of ES&H controls, pre-job training, mentoring for qualification, operational checks, pre-job testing, safety checks; (e.g., systems, equipment, instruments, etc.), and project management reviews. In the pre-job phase, hazard analysis is closely linked to the establishment of adequate ES&H controls, the training and briefing of workers, the planning of the actual work, the development of a resource-loaded plan, and schedule to perform the work.

#### Operations Authorizations

To help insure that certain hazardous work is well planned and adequate preparations are made before it begins, the Lab has a system of operations (work) authorizations.

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<sup>1</sup> Any activity that leads to the capitalization of an asset. Planning and tracking are scaled to the cost of the activity.

There are a number of mechanisms in which DOE authorizes URA to do work.

- The DOE/URA contract. This includes the definition of the ES&H standards (Work Smart Standards) as well as other administrative requirements.
- Construction authorizations. The system of Project Directives includes the Lab defining the construction projects with fully loaded cost, scope and schedule--generally GPP, AIP, and line item construction projects. Approval for funding and construction is granted by the Contracting Officer.
- ES&H related authorizations; e.g., Safety Assessment Document and Readiness Review concurrence.
- Annual budget/work authorization process. This includes the submission by the Lab of Field Work Proposals which define the work anticipated by the Lab (for current year work and work for the two out years), Program Reviews which review current and future planned operations, and Financial Plans which define the work to be done and money allocated for each activity. Each month there is a refinement of the financial plan--adding or subtracting work/money.

Within the Laboratory, there are a number of mechanisms for the Director to authorize work at the division/section level.

- Divisions/Sections participate in the annual budget process described above. Thus, with the arrival of the each financial plan, the Director authorizes divisions/sections to conduct the work described in the plan.
- The Director's concurrence is required by some ES&H programs; e.g., readiness reviews, Safety Assessment Documents.

Various levels of work authorizations are called out within the ES&H program. For example:

- FESHM 2010, 2020, 2021, 2060, 7010, 7020, & 7030-- stop work orders, work notification, etc.
- FESHM 5010-- review of purchase orders.
- FESHM 5030, 5031, 5033, & 5034--pressure vessel sign off
- FESHM 5040--electrical safety hazard analysis/work permit
- FESHM 5062.1--lasers
- FESHM 5063--confined space
- FESHM 8060--NEPA reviews
- FESHM 5064--Oxygen Deficiency Hazards
- FESHM 5120--LOTO
- FESHM 6030--disablement permits
- FESHM 7010, 7020, & 7030—notice to proceed, hazard analysis, safety plan acceptance
- FESHM 8020--regulated waste, storage, etc.
- FESHM 8040--pesticide permits
- FESHM 9030--aviation permits

- FRCM--Numerous work authorization requirements are called out in the Fermilab Radiation Control Manual.

The Laboratory has established work control processes (Fermilab Project Control Systems Guidelines, 11/11/94) to assure that projects leading to the capitalization of an asset are appropriately scoped, planned and managed (including necessary reporting and performance tracking).

### Responsibilities

As stated in the ES&H Manual Section 1030, it is the responsibility of the line managers/supervisors and the workers to perform the work safely. As such, it is the responsibility of the division/section heads to ensure that: (1) appropriate sign-off procedures are established to ensure the safety of division/section activities, (2) there are provisions for all new and existing operations to undergo an ES&H review and hazards analysis, (3) all operational procedures are consistent with Fermilab ES&H policies, (4) all division/section personnel are trained in safety procedures, (5) potential hazards are identified and corrected, (6) requirements are identified and adequate ES&H controls are implemented to ensure that all work undertaken at Fermilab is performed in a safe and compliant manner.

At Fermilab, the worker is the first line of defense against accidents. As defined by the Fermilab ES&H Manual Section 1030, it is the responsibility of each Laboratory employee to: (1) conduct activities safely, (2) notify his/her supervisor if he/she feels unqualified or insufficiently trained to perform a task, (3) be aware that telephone extension 3131 can be used to get emergency assistance, (4) stop any of his/her activities which pose imminent hazards to personnel or the environment and notify his/her supervisor and the division/section ES&H group, (5) report activities or conditions of others which pose imminent hazards to personnel or the environment to his/her supervisor and the division/section ES&H group, (6) report persistent unsafe activities or safety violations to his/her supervisor, (7) be aware of calibration dates on any ES&H instrumentation and refrain from the use of instrumentation for which the calibration has expired, and (8) be held accountable to his/her supervisor for willful disregard of ES&H procedures.

Critical to establishing the worker's role in safe operations, Fermilab has established the supervisor as critical backup to the worker. In accordance with the Fermilab ES&H Manual Section 1030, the roles and responsibilities of the supervisor are to: (1) ensure individuals under their supervision are trained to do their assigned activities safely, (2) ensure that individuals under their supervision are trained to recognize hazards, (3) monitor activities under their supervision for safe operation, (4) stop work processes under their supervision involving imminent hazards to personnel or the environment when discovered and notify the management and division/section ES&H group, (5) be responsive to the ES&H concerns of those under their supervision.

Safe physics operations and work are also ensured by trained operators who are aware of the hazards and established controls, utilizing approved procedures to effectively operate equipment within safety/operating envelopes, which are monitored by controls systems and supervisors.

#### 4.5 Assessing Performance for Continuous Improvement

The Laboratory measures the ISMP effectiveness by various measures of our performance. Performance measurement at Fermilab is achieved through multi-level assessments and measurement activities including line self-assessments and feedback mechanisms, independent ES&H Section and safety committee oversight, Directorate level management assessments, partnering oversight by the DOE, and inclusion of ES&H performance measures in the contract between URA and DOE. External regulatory oversight is performed by the DOT, IDOT, EPA and the IEPA for transportation and environmental aspects of Fermilab operations.

At the core of our assessment and continuous improvement program are the Tripartite assessments. The Tripartite assessments are performed by teams composed of ES&H Section professionals, line technical and professional ES&H personnel, and the ES&H personnel from the DOE Fermi Area Office. These assessments include formal reports, prepared with DOE involvement, on the full range of ES&H activities and performance. Findings from Tripartite assessments and findings from all other sources are tracked to closure in a computer database, ESHTRK. The features of ESHTRK include the ability to assign risk.

In addition to the formal Tripartite assessments, line organizations provide feedback and improvement information to the Director through their quarterly self-assessments reports. The quarterly report by the Senior Laboratory Safety Officer includes status reports on any high priority ES&H issues.

Occurrence and CAIRS reports and lessons learned from them are an important part of the weekly Scheduling Meetings.

Annual personnel appraisals (discussed in Section 3.3) are tied, in part, to ES&H performance and work activities.

Triennial management appraisals are conducted by the Laboratory Directorate to assess Fermilab's overall performance in meeting the Director, URA, and Department of Energy ES&H objectives. The results of the appraisal, including specific recommendations for improvements, are communicated to the respective department managers, in order to assure lessons learned are integrated into future work activities.

The URA has established an ES&H Subcommittee of the Board of Overseers. This subcommittee meets each quarter with representatives of the Directorate and the Senior Laboratory Safety Officer and his/her staff to review current ES&H performance. The results of the subcommittee deliberations are reported to the full assembly of the Board.



The ES&H Section sends out Safety Updates to Senior Safety Officers and other personnel as appropriate, e.g., when "lessons learned" are received from other labs or industrial sources. The Fermilab ES&H Section web site also includes a vast array of safety information and services that can be accessed by all Lab employees. Notification of new "lessons learned" is distributed electronically within the Lab.

The Fermilab Employee concerns program is documented in FESHM 1060.

## **5.0 ISM AND OTHERS--SUBCONTRACTORS, RESEARCHERS, AND VISITORS**

This section describes some of the key features of Fermilab's program to integrate ES&H in the relationships with other groups. Table 4 lists some of the mechanisms used to communicate with subcontractors, public, visitors and users.

**Table 4**

**Communication of ES&H Information with Other Groups**

Information about Fermilab expectations (program, ES&H, etc.) is communicated to other interested groups. Some of the communication mechanisms are listed in this table.

Subcontractors	Opportunities for communication of ES&H information to subcontractors include: Request for Proposals, bid documents, pre-construction meetings, construction site visits, required training classes, subcontractor safety orientation and hazard analysis process.
Public	The Office of Public Affairs preparation and distribution of Lab related literature
	Office of Public Affairs organized public events
	Press releases
	Employee participation in public meetings
	Employee communication with neighbors and friends
	Employee participation as members of public organizations
Visitors	Fermilab literature
	Tours
Users	Procedure for Experimenters
	Formal Agreements
	Weekly, Monday 4:00 P.M. All Experimenters Meeting
	Fermilab Users Office
	Safety Orientation
	Fermilab Program Planning Office

## 5.1 ISM and Subcontractors

Fermilab is committed to implementing ES&H requirements for activities involving subcontractors, participating guests and visitors, while maintaining an appropriate business relationship that does not result in unnecessary assumption of liability for contractor operations. FL-3 and FL-4 are clauses that contain an accident prevention clause that is inserted into subcontracts for service and construction labor. They specify that contractors must have integrated safety into their business activities and follow all applicable ES&H requirements. These same ES&H requirements are expected to “flow down” to sub-tier subcontractors as well. All subcontracts contain provisions for stopping work and terminating contracts for lack of ES&H performance. Certain subcontractor individuals may be excluded from the site for failure to follow ES&H requirements. Fermilab has a practice of excluding subcontractors from bidding if they have a record of poor ES&H performance.

### Temporary Support Services Subcontractors

Temporary support services personnel work at Fermilab for short periods of time, usually to help with peak loads or to fill in for temporary absences. While they may perform the same work as Laboratory employees, compensation and benefits are received through their own employer, a Fermilab subcontractor.

Temporary support services personnel are required to follow the same ES&H requirements as Laboratory employees, including new employee orientation training.

### Construction Subcontractors

Construction subcontractors perform any combination of engineering, procurement, erection, installation, demolition, or fabrication used to create a facility or alter, an existing facility. This also includes any construction and excavation activities conducted as part of the environmental redemption efforts.

Fermilab maintains a comprehensive construction safety program, which is documented in Chapter 7010 of FESHM. Subcontractors are required to have an ES&H program, and for those subcontracts greater than \$100,000 in value, to submit for acceptance a description of that program. For very large projects, such as the NuMI Surface Building and Outfitting contract, the subcontractor is required to submit an ISM plan as well. In addition, hazard analyses must be performed and submitted to Fermilab for acceptance prior to the commencement of the work activity. The hazard analyses include a description of the phase of work, the hazards associated with the work activity, and mitigating actions to be taken to reduce those hazards. Fermilab task managers and construction coordinators assure compliance with these plans and hazard analyses as part of their routine construction management functions. In addition, both division/section and ES&H Section personnel provides technical support to task managers as well as oversight of the construction safety program.

Fermilab evaluates the safety statistics of the apparent low bidder on all construction projects. If pre-established criteria are not met (See FESHM 7010), the contract is not awarded to that bidder.

### Service Subcontractors

Fermilab employs service subcontractors to provide daily services. The largest provide security, cafeteria and janitorial services. In each instance, subcontract clause FL-4 requires the subcontractor to have a comprehensive ES&H program in place, including a formal new employee orientation, submission of a formal ES&H plan, and appropriate training and personal protective equipment. The requirement for a safety management system is included as well. FESHM 7020 also specifies a process requiring additional ESH review for hazard analysis.

## 5.2 ISM and Researchers

Researchers coming to Fermilab are provided access to the Procedures for Experimenters (PFX). The manual provides guidance to researchers about how to propose experiments, get experiments approved, as well as prepare and carry out experiments at Fermilab. Chapter 2 of the PFX, *What Every Experimenter Must Know*, contains the ES&H requirements with which experimenters must comply. The table of contents of Chapter 2 includes the following:

- ES&H Policies
- What to do in an emergency
- Working safely at Fermilab
- Responsibilities of experimenters
- Protecting the environment
- Visitors and children at Fermilab.

## 5.3 ISM and Visitors

The following, taken from Chapter 11010 of the FESHM, demonstrates how ISM is integrated into the visitor safety program.

### **‘INTRODUCTION**

It is Fermilab policy to ensure access to all facilities where hazards not normally found in public areas be controlled so that untrained or unescorted personnel do not inadvertently subject themselves to undue risk. Inadvertent exposure to hazards such as exposed high voltage, explosive/flammable gases, toxic chemicals, heavy rigging, ODH areas, complex machinery, and radiation/radioactive materials must be prevented. Additionally, access to areas where the possibility of displacement or damage to delicate, accurately aligned apparatus necessary to the operation of the experimental program must also be controlled. Generally, the Laboratory is divided into three areas - areas where

the public is invited and encouraged, areas that are restricted due to unfamiliar hazards, and areas where access is strictly controlled.

## **SPECIAL RESPONSIBILITIES**

Each division/section at Fermilab shall evaluate the facilities under its jurisdiction and post them in conformance with requirements in the ES&H Manual. Divisions/Sections shall take measures to enforce laboratory access requirements, limiting access to personnel meeting these requirements. For areas requiring controlled access; barriers, locks, control points, or other appropriate methods shall be established and maintained. For restricted areas, signs prohibiting unauthorized entry and/or locks may be necessary.

It is the responsibility of every user and Fermilab employee who brings a guest to be familiar with, and in compliance with, Fermilab safety practices and procedures and to see that they are followed. More stringent requirements may be required by divisions/sections. All persons, including members of the public, guests, employees, vendors and users, are expected to observe and comply with all signs and barriers that restrict access. Employees are expected to be alert to the presence of persons in their workplace who appear to be insufficiently trained to be in the area safely. If such persons are found, employees are expected to take appropriate steps to prevent injury, such as asking the person to leave, or notifying their supervisor.

## **PROCEDURES**

Fermilab has established specific access requirements for the public, guests and children. Division/Section heads may apply to the Director for exception to these access requirements on a case by case basis.

### Public Access

The parts of the Laboratory generally open to the public include the Lederman Science Center, the auditorium, and parts of Wilson Hall (15th floor, second floor cross-over, and atrium). In addition the public has access to certain outdoor areas for the purposes of recreation; e.g., the bicycle path, and dog exercise areas.

### Guest Access

It is the policy of Fermilab that, due to health and safety hazards that exist in technical and experimental areas, admission of guests to these areas of the Laboratory be restricted. You should contact your supervisor before bringing a guest into a restricted area of the Laboratory.

### Children at Fermilab

Everyone under 18 years old, including children of employees, visiting scientists and DOE employees, must be continuously supervised by an adult while visiting areas other than those open to the public. Children may be permitted in office areas if the offices and the path from public areas to the offices are not restricted. On a case by case basis, the division/section head responsible for an area may give permission for a properly escorted child to visit a restricted area. In this case the department head/facility manager will be responsible for assuring that the work area is safe for properly supervised children. Children shall not be allowed to work in or have access to areas with radioactive materials and radiation except as specified in the Fermilab Radiological Control Manual Article 931.”

## **6.0 ANNUAL IMPLEMENTATION PLAN**

Fermilab develops an ES&H Implementation Plan in support of the Laboratory’s Integrated Safety Management Plan, including specific performance commitments. The Plan is updated annually to reflect progress made, changes in mission and site budgets, and feedback aimed at improved performance objectives and measures. The Implementation Plan is prepared in three parts, (1) an ES&H Budget and Risk Management Summary submitted in April of each year in response to the DOE budget call, (2) and documents typically prepared prior to the execution year (e.g., in September) that establish performance measures for the coming year and (3) provide a summary of the previous year's ES&H performance. A description of these three documents is provided below.

- ES&H Budget Plan and Risk Management Summary - Response to Budget Unicall identifying risks and resource requirements.

This Plan identifies the resources needed to fulfill these commitments and meet ES&H objectives, and assure adequate ES&H skill level and mix is available to support the accomplishment of the site's mission. The Fermilab FY02 ES&H Budget Plan and Risk Management Summary can be found at [http://www-esh.fnal.gov:8001/Mgmt\\_Plan/](http://www-esh.fnal.gov:8001/Mgmt_Plan/).

- Performance Measures for the Execution Year - Measures established to document performance expectations.

The document includes ES&H performance objectives and commitments, responsive to the Department's safety expectations, consistent with mission, budget direction, and program guidance and direction. The measures reflect the Laboratory's understanding of the DOE's ES&H performance expectations, and describe expected outcomes resulting from work commitments. Key milestones and schedules tied to commitments

are identified. The performance measures for FY2002 can be found at [http://www-esh.fnal.gov:8001/PM/FY02\\_PMs/CPMD02.htm](http://www-esh.fnal.gov:8001/PM/FY02_PMs/CPMD02.htm).

- Summary of Previous Year's ES&H Performance - Summary of actual performance compared with previous year's performance measures and commitments. The summary of ES&H performance for FY2001 can be found at [http://www-esh.fnal.gov:8001/PM/FY01\\_PMs/CPMD01.htm](http://www-esh.fnal.gov:8001/PM/FY01_PMs/CPMD01.htm).

This document describes performance results compared against the previous year's Plan commitments, performance objectives and measures, including: results of the contractor's self-assessment of the previous year's performance with respect to the measures and commitments negotiated for the previous year; and specific description of how risks were actually reduced.